



United States Department of the Interior



FISH AND WILDLIFE SERVICE

New Mexico Ecological Services Field Office
2105 Osuna Road NE
Albuquerque, New Mexico 87113
Telephone 505-346-2525 Fax 505-346-2542
www.fws.gov/southwest/es/newmexico/

In Reply Refer To:
FWS/R2/ES/02ENNM00-2020-F-1537

April 16, 2021

Memorandum

To: Cliff Schleusner, Chief, Division of Wildlife and Sport Fish Restoration Program,
U.S. Fish and Wildlife Service, Southwest Region 2, Albuquerque, New Mexico

From: Shawn Sartorius, Field Supervisor, New Mexico Ecological Services Field Office,
U.S. Fish and Wildlife Service, Southwest Region 2, Albuquerque, New Mexico

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Subject: Streamlined Biological Opinion for the Section 6 Funding Proposal for
Survey and Radio-tracking of Narrow-headed Gartersnakes

This memorandum transmits the New Mexico Ecological Services Field Office's biological opinion based on our review of the January 29, 2021, Intra-Service Section 7 Biological Evaluation (BE) for the Section 6 funding (funded through the Wildlife and Sport Fish Restoration Program) proposal for survey and radio-tracking of the narrow-headed gartersnake (*Thamnophis rufipuncatus*). The BE analyzed the effects to threatened and endangered species from the issuance of the grant, as well as surveying, capturing, and handling threatened and endangered species that will result from the issuance of the grant.

In the BE, the Wildlife Sport Fish Restoration Program (WSFR) made an effects determination for the proposed action of "may affect, not likely to adversely affect" for Chihuahua chub (*Gila nigrescens*), Gila chub (*Gila intermedia*), and Gila topminnow (*Poeciliopsis occidentali*). Based on the April 25, 2012, *Memorandum of Agreement for Conducting Endangered Species Act Section 7(a)(2) and Section 7(a)(4) Analysis on Grants Administered by the Wildlife and Sport Fish Restoration Program* and the June 13, 2017, *Guidance for Wildlife and Sport Fish Restoration Program Funding Programs to Assure Endangered Species Act, Section 7*

Compliance memorandum, WSFR was delegated limited authority for all grant programs to make some determinations on Intra-Service Section 7 BEs. Based on these memorandums, concurrence from Ecological Services for these species is not required.

In the BE, WSFR also made an effects determination for the proposed action of “may effect, is likely to adversely affect” for New Mexico meadow jumping mouse (*Zapus hudsonius luteus*), Chiricahua leopard frog (*Lithobates chiricahuensis*), Northern Mexican gartersnake (*Thamnophis eques megalops*), narrow-headed gartersnake, Gila trout (*Oncorhynchus gilae*), loach minnow (*Tiaroga cobitis*), and spikedace (*Meda fulgida*).

Additionally, the January 2021 BA included determinations of “no effect” for the jaguar (*Panthera onca*) and associated critical habitat (CH), southwestern willow flycatcher (*Empidonax traillii extimus*) and associated CH, Mexican long-nosed bat (*Leptonycteris nivalis*), Mexican wolf (*Canis lupus baileyi*), least tern (*Sterna antillarum*), Mexican spotted owl (*Strix occidentalis lucida*) and associated CH, Northern Aplomado falcon (*Falco femoralis septentrionalis*), Piping plover (*Charadrius melodus*), New Mexican ridge-nosed rattlesnake (*Crotalus willardi obscurus*) and associated CH, Beautiful shiner (*Cyprinella formosa*) and associated CH, Alamosa springsnail (*Tryonia alamosae*), Chupadera springsnail (*Pyrgulopsis chupaderae*) and associated CH, Socorro springsnail (*Pyrgulopsis neomexicana*), Socorro isopod (*Thermosphaeroma thermophiles*), Pecos sunflower (*Helianthus paradoxus*) and associated CH, Todsens’ pennyroyal (*Hedeoma todsenii*) and associated CH, Zuni fleabane (*Erigeron rhizomantus*), western yellow-billed cuckoo (*Coccyzus americanus occidentalis*) and proposed CH, Rio Grande silvery minnow (*Castostomus discobolus*) and associated CH, New Mexico meadow jumping mouse CH, Chiricahua leopard frog CH, Gila chub CH, loach minnow CH, and spikedace CH. Although the Endangered Species Act does not require Federal agencies to consult with the United States Fish and Wildlife Service if the action agency determines their action will have “no effect” on threatened or endangered species or designated critical habitat (50 CFR 402.12), we appreciate your consideration for the conservation of these species and notification of your “no effect” determinations.

The enclosed biological opinion is based on information provided in the January 29, 2021, BE and other sources of information and was completed pursuant to the November 16, 2016, U.S. Fish and Wildlife Service policy on *Streamlined Consultation Guidance for Restoration/Recovery Projects* and associated documents.

Thank you for your concern for threatened and endangered species and New Mexico’s wildlife resources. If you have any questions, please contact Chad Baumler of my staff at the letterhead address or by electronic mail at chad_baumler@fws.gov.

Cc: Director, New Mexico Department of Game and Fish, Santa Fe, New Mexico
Director, New Mexico Energy, Minerals, and Natural Resources Department, Forestry
Division, Santa Fe, New Mexico
SWG Grant Manager, U.S. Fish and Wildlife Service, Wildlife & Sports Fish Restoration,
Albuquerque, New Mexico
Amphibians and Reptiles Biologist, New Mexico Department of Game and Fish, Santa Fe,
New Mexico
Assistant Chief - Wildlife, New Mexico Department of Game and Fish, Santa Fe, New
Mexico

Streamlined Biological Opinion for the Section 6 Funding Proposal for Survey and Radio-tracking of Narrow-headed Gartersnakes

2021-F-1537

April 2021

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Shawn Sartorius
Field Supervisor
New Mexico Ecological Services Field Office

Date

BIOLOGICAL OPINION

A biological opinion is the opinion of the U.S. Fish and Wildlife Service (Service) as to whether a Federal action is likely to “jeopardize the continued existence” of a species listed under the Endangered Species Act (Act) or result in the “destruction or adverse modification” of designated critical habitat (50 CFR §402.02).

In the January 29, 2021, Intra-Service Section 7 Biological Evaluation (BE), the Wildlife and Sport Fish Restoration Program (WSFR) made an effects determination for the proposed action of “may effect, and is likely to adversely affect” for New Mexico meadow jumping mouse (*Zapus hudsonius luteus*), Chiricahua leopard frog (*Lithobates chiricahuensis*), Northern Mexican gartersnake (*Thamnophis eques megalops*), narrow-headed gartersnake (*Thamnophis rufipunctatus*), Gila trout (*Oncorhynchus gilae*), loach minnow (*Tiaroga cobitis*), and spikedace (*Meda fulgida*).

I. Description of the Proposed Action

The proposed action is the Section 6 funding for the New Mexico Department of Game and Fish (Department) to perform field activities by WSFR. The following field activities are planned: Department proposes for contractors to survey for narrow-headed gartersnake and its habitat, to translocate, as necessary, adult and juvenile narrow-headed gartersnakes, and to radio-track translocated snakes if the individual animal is large enough to safely apply a transmitter.

Contractors with the Department will conduct and update statistically defensible surveys for extant populations of narrow-headed gartersnake in New Mexico, within the Gila and San Francisco River drainages. The Contractor will employ appropriate survey techniques as needed, including but not limited to gee minnow traps and visual encounter surveys. For each snake captured, the contractor will record snout-vent length, tail length, sex, and body mass. If deemed necessary, other samples will be taken. Contractors will mark each snake for recapture data, using a medical cautery unit for neonates or PIT tags for sub-adults and adult snakes. Contractors with the Department will measure and record abiotic variables, such as water flow rate, water depth, water temperature, stream width, and air temperature at each location of capture.

Contractors with the Department will also relocate all captured narrow-headed gartersnakes from the Diamond Creek drainage in Catron County, New Mexico, to Black Creek Canyon in Grant County, New Mexico, following all guidelines to ensure the health and safety of the animals (Novak 2013, direct discussions with Service lead for the species). Contractors will radio track all relocated adult narrow-headed gartersnakes via transmitters that will be ingested and later defecated by the snake. If contractors with the Department determine an individual snake is sick or moribund, they will contact the narrow-headed gartersnake lead biologist with the New Mexico Ecological Services Field Office and send the snake to the United States Geological Survey National Wildlife Health Center for examination for potential diseases.

Species that may be incidentally caught during survey events include the New Mexico meadow jumping mouse, Chiricahua leopard frog, Northern Mexican gartersnake, Gila trout, loach minnow, and spikedace.

Define the Action Area

The proposed action will occur at streams throughout Catron, Grant, and Hidalgo counties in New Mexico, where it reaches the northern and eastern edge of the narrow-headed gartersnake's overall distribution.

Survey locations may include, but are not limited to, Tularosa River at Hells Hole, Saliz Creek, Diamond Creek, Black Creek Canyon, Turkey Creek, Whitewater Creek at catwalk, South Negrito Creek, middle fork of Gila River between Iron Creek and Indian Creek, San Francisco River, and the west fork and the mainstem of Gila River.

Conservation Measures

The Proposed Action is comprised of limited disturbance of habitat. All incidental fish and any other species caught will be released immediately after discovery. Disturbance to species that use vegetation adjoining where surveys are conducted will be minimized and vehicle use will be kept away from such areas by personnel hiking into survey areas. Safety and biosecurity protocols dictated in Federal permit training for the targeted species will be adhered to.

II. Status of the Species in the Action Area- Environmental Baseline

Northern Mexican gartersnake

The Northern Mexican gartersnake was historically found within nearly every major watershed in Arizona (with the exception of the Little Colorado River watershed) and southwestern New Mexico including the Colorado, Verde, Salt, San Pedro, and Gila watersheds, extending south along the Mexican Plateau to near Mexico City. Recent sampling data suggest that perhaps only four populations of northern Mexican gartersnakes in the United States are considered relatively dense where the species remains somewhat reliably detected: 1) upper Santa Cruz River in the San Rafael Valley; 2) lower Tonto Creek; 3) Verde Valley; and 4) the Aquatic Research and Conservation Center (formerly known as the Page Springs and Bubbling Ponds State Fish Hatcheries) adjacent to Oak Creek.

Throughout its rangewide distribution, the Northern Mexican gartersnake occurs at elevations from 140 to 8,497 feet (43 to 2,590 meters) within a wide variety of biotic communities including Sonoran Desert scrub through Semidesert Grassland, Interior Chaparral, Madrean Evergreen Woodland, into the lower reaches of Petran Montane Conifer Forest (Rossman *et al.* 1996, Brennan and Holycross 2006). Considered a "terrestrial-aquatic generalist" by Drummond and Marcías-García (1983), the Northern Mexican gartersnake is often found in riparian habitat, but also may spend time in terrestrial habitat removed from water (Nowak 2013). Aquatic habitat is used for prey acquisition and can be either lentic (stock tanks, ponds, ciénegas, etc.) or lotic (low-gradient streams). Aquatic edge habitat is frequently used, followed by terrestrial habitat (for thermoregulatory purposes such as gestation and periods of dormancy) and developed areas, with snakes documented using artificial, human-created objects as surface cover (Boyarski *et al.* 2015).

Northern Mexican gartersnakes could be visible on the surface any day of the year if the preceding evening is above freezing (Emmons 2016). Longevity in the wild was estimated to be at least 10-11 years by Boyarski *et al.* (2019). Sexual maturity in Northern Mexican

gartersnakes occurs at two years of age in males and at two to three years of age in females (Rosen and Schwalbe 1988). Mating has been documented in April and May followed by the live birth of between 7 and 38 newborns from June through September (Rosen and Schwalbe 1988, Degenhardt *et al.* 1996, Nowak and Boyarski 2012, Cobbold 2018). A staggered or biennial reproductive strategy is believed to be used by Northern Mexican gartersnakes (Rosen and Schwalbe 1988, Boyarski *et al.* 2019).

Narrow-headed gartersnake

The historical distribution of the narrow-headed gartersnake ranged across the Mogollon Rim and along associated perennial stream drainages from central and eastern Arizona, southeast to southwestern New Mexico at elevations ranging from 2,300 to 8,000 feet (700 to 2,430 meters) (Rosen and Schwalbe 1988, Rossman *et al.* 1996, Holycross *et al.* 2006). Gartersnakes were historically distributed in headwater streams of the Gila River subbasin that drain the Mogollon Rim and White Mountains in Arizona, and the Gila Wilderness in New Mexico. Major subbasins in its historical distribution included the Salt and Verde River subbasins in Arizona, and the San Francisco and Gila River subbasins in New Mexico (Holycross *et al.* 2006). Holycross *et al.* (2006) suspect the species was likely not historically present in the lowest reaches of the Salt, Verde, and Gila Rivers, even where perennial flow persists. Existing sampling data suggest that perhaps only three populations of narrow-headed gartersnakes are considered relatively dense where the species remains somewhat reliably detected: 1) Tularosa River (New Mexico); 2) Middle Fork Gila River (New Mexico); and 3) Oak Creek/ West Fork Oak Creek (Arizona).

This species is strongly associated with clear, rocky, often perennial streams, using predominantly pool and riffle habitat that includes cobbles and boulders (Rosen and Schwalbe 1988, Degenhardt *et al.* 1996, Rossman *et al.* 1996, Nowak and Santana-Bendix 2002, Ernst and Ernst 2003). Narrow-headed gartersnakes have also been documented using isolated pools within intermittent streams as foraging habitat (Cotton *et al.* 2017) and have been observed using reservoir shoreline habitat in New Mexico (Flehart 1967, Rossman *et al.* 1996, Hellekson 2012). Narrow-headed gartersnakes found in water represented less than 10 percent of total observations according to a multi-year telemetry study in New Mexico (Jennings and Christman 2012) which suggests that this species may spend a relatively small percentage of its time in the water.

Narrow-headed gartersnakes also use terrestrial, upland habitat and a variety of organic and inorganic cover for their thermoregulatory needs such as for shelter during periods of cold-season dormancy, basking in gestation of young in pregnant females, facilitating digestion, healing from injury or illness, and to escape flood events. In New Mexico, narrow-headed gartersnakes were observed using cover objects consisting of rocks, earthen burrows, debris pile, stumps/logs and vegetation when not observed in the water or on the ground surface (Jennings and Christman 2012). Narrow-headed gartersnakes eat fish (Rosen and Schwalbe 1988, Degenhardt *et al.* 1996, Rossman *et al.* 1996, Nowak and Santana-Bendix 2002, Nowak 2006, Jennings and Christman 2012), and are considered specialists in this regard. This species is an underwater ambush hunter, believed to be heavily dependent on visual cues when foraging (de Queiroz 2003, Hibbitts and Fitzgerald 2005). Therefore, sediment and turbidity levels within the water column may affect foraging success.

Chiricahua leopard frog

The range of the Chiricahua leopard frog in the U.S. includes central and southeastern Arizona and west-central and southwestern New Mexico. In Mexico, it occurs in northeastern Sonora, the Sierra Madre Occidental of northwestern and west-central Chihuahua, and possibly as far south as northern Durango (Platz and Mecham 1984; Degenhardt *et al.* 1996; Sredl and Jennings 2005; Brennan and Holycross 2006; Lemos-Espinal and Smith 2007; and Rorabaugh 2008). The distribution of the species in Mexico is unclear due to limited survey work and the presence of closely related taxa (especially *Lithobates lemosespinali* (no common name)) in the southern part of the range of the Chiricahua leopard frog. Based on 2010 data, the species still occurs in most major drainages in Arizona and New Mexico where it occurred historically; the exception to this is the Little Colorado River drainage in Arizona (USFWS 2011). In Arizona and New Mexico, the species likely occurs at about 14 percent and 16 to 19 percent of its historical localities, respectively (USFWS 2007).

The most recent 5-year status review (USFWS 2011) estimates that there are 90, 29, and 45 Chiricahua leopard frog occupied sites in Arizona, New Mexico, and Mexico, respectively. Occupied sites are defined as sites that range from one individual Chiricahua leopard frog (i.e., egg mass, tadpole, metamorph, or adult) to a robust breeding population. The occupied sites have increased in Arizona and New Mexico; however, to a lesser extent in New Mexico than in Arizona. The increase in occupied sites is primarily the result from active management, which includes removing American bullfrogs, habitat creation, and habitat enhancement, and from the reintroduction of Chiricahua leopard frogs.

The Chiricahua leopard frog is known currently and historically to occupy ciénegas (mid-elevation wetland communities often surrounded by arid environments), pools, livestock tanks, lakes, reservoirs, streams, and rivers at elevations of 3,281 – 8,890 feet (994 – 2,694 meters) in central and southeastern Arizona, west-central and southwestern New Mexico, and northern Sonora and the Sierra Madre Occidental of Chihuahua and Durango, Mexico. Extensive research was conducted to determine the extent of populations remaining, resulting in the listing of the species as threatened in 2002 (77 FR 16324).

Shallow waters with emergent and perimeter vegetation provide tadpole and adult basking habitats, while deeper water, root masses, and undercut banks provide refuge from predators and potential sites for hibernation (Sredl and Jennings 2005). Most perennial waters supporting frogs have fractured rock substrate, emergent or submergent vegetation, deep water, root masses, undercut banks, or some combination of these features that frogs may use as refugia from predators and climatic conditions. Chiricahua leopard frog breeding season is from June through August. Frogs may over-winter at or near breeding sites, although these microsites have not been studied. Other leopard frog species typically over-winter at the bottom of well-oxygenated ponds and may bury themselves in the mud (Nussbaum *et al.* 1983, Harding 1997).

New Mexico meadow jumping mouse

The historical distribution of the jumping mouse likely included riparian wetlands along streams in the Sangre de Cristo and San Juan Mountains from southern Colorado to central New Mexico, including the Jemez and Sacramento Mountains and the Rio Grande Valley from Española to Bosque del Apache National Wildlife Refuge, and into parts of the White Mountains in eastern Arizona.

Based on historical (1980s and 1990s) and current (from 2005 to 2020) data, the distribution and abundance of the jumping mouse has declined significantly range-wide. The majority of extirpations have occurred since the late 1980s to early 1990s, as we found about 70 formerly occupied locations are now considered extirpated. Since 2005, there have been 77 documented remaining populations (18 in Colorado, 22 in New Mexico, and 37 in Arizona) spread across the eight geographic management areas described in the final listing rule (Service 2020). Nearly all of the current populations are isolated and widely separated, and nearly all of the 77 populations located since 2005 have patches of suitable habitat that are too small to support resilient populations of jumping mice. In addition, at least 11 populations documented since 2005 have been substantially compromised since 2011 (due to water shortages, grazing, or wildfire and post-fire flooding), and these populations could already be extirpated (see Service 2014a for a detailed discussion).

Due to the life history (short active period, short life span, low fecundity, low dispersal ability) and because the jumping mouse requires such specific suitable habitat conditions, populations have a high potential for extirpation when habitat is altered, fragmented, or eliminated. We found that there has been a significant reduction in occupied localities likely due to cumulative habitat loss and fragmentation across the range of the jumping mouse. The past and current habitat loss has resulted in the extirpation of historical populations, reduced the size of existing populations, and isolated existing small populations. Ongoing and future habitat loss is expected to result in additional extirpations of more populations. The primary sources of past and future habitat losses are from grazing pressure (which removes the needed vegetation) and water management and use (which causes vegetation loss from mowing and drying of soils), lack of water due to drought (exacerbated by climate change), and wildfires (also exacerbated by climate change). Additional sources of habitat loss are likely to occur from scouring floods, loss of beaver ponds, highway reconstruction, residential and commercial development, coalbed methane development, and unregulated recreation.

Loach minnow

The loach minnow is endemic to the Gila River basin of Arizona and New Mexico and Sonora, Mexico. In Arizona, the loach minnow occupied as many as 2,250 km (1,400 mi) of stream length, but it is now found in less than 10 percent of that range and is generally rare to uncommon (USFWS 2011). Present populations are geographically isolated and inhabit upstream areas of their historical range, which included the basins of the Verde, Salt, San Pedro, San Francisco, and Gila Rivers (Minckley 1973; Sublette *et al.* 1990). The species is believed to be extirpated from Mexico. In New Mexico, the loach minnow was historically found throughout warmwater reaches of the San Francisco and Gila Rivers and their major tributaries (Propst *et al.* 1988). The species has become very rare in substantial portions of its remaining range in New Mexico, and now occupies only fragmented reaches of the San Francisco and Gila drainages (Propst *et al.* 1988). The loach minnow is currently moderately common in less than 10 km (6.2 mi) of the Tularosa and San Francisco Rivers (Paroz and Propst 2007). In the lower reaches of the West Fork Gila River, a small population persists (Paroz *et al.* 2009) and the population in the Gila-Cliff Valley has declined considerably in the past 15 years (Paroz *et al.* 2006). Elsewhere in the Gila-San Francisco drainage, the loach minnow occurs irregularly or is absent (Paroz *et al.* 2006; Paroz and Propst 2007). The loach minnow is one of the rarest of the remaining five species of native fishes inhabiting the Gila River and its tributaries (Paroz *et al.* 2006).

During the last century, loss of habitat, competition and predation by nonnative aquatic species have reduced the historical range of the loach minnow by about 85 percent (Miller 1961; Hendrickson and Minckley 1984; Williams *et al.* 1985; Marsh *et al.* 1989; USFWS 1994). Both historical and present landscapes surrounding loach minnow habitats have been impacted to varying degrees by livestock grazing, mining, agriculture, timber harvest, wildfire, recreation, development, or impoundments (Hendrickson and Minckley 1984; Belsky *et al.* 1999). Land and water use practices have impaired perennial flows and natural hydro graphs (Minckley and Meffe 1987). These activities can degrade loach minnow habitats by altering flow regimes, increasing watershed and channel erosion, contributing to increased sedimentation, and adding contaminants to streams and rivers (Belsky *et al.* 1999). Alteration of the natural flooding characteristic of desert streams has degraded habitat and increased competition from introduced nonnative species (Minckley and Meffe 1987). As a result, these activities may affect loach minnow through direct mortality, interference with reproduction and predator avoidance, and reduction of invertebrate food supplies.

Gila trout

The Gila trout was originally recognized as endangered under the Federal Endangered Species Preservation Act of 1966 (USFWS, 1967). Federal-designated status of the fish as endangered was continued under the Endangered Species Act of 1973 (ESA). Gila trout was reclassified, or downlisted, from endangered to threatened in 2006 (USFWS, 2006). The Gila trout (*Oncorhynchus gilae*) is endemic to mountain streams in the Gila, San Francisco, Agua Fria, and Verde River drainages in New Mexico and Arizona (Miller, 1950; Minckley, 1973; Behnke, 1992). Although Gila trout were known in the upper Gila River basin since at least 1885, it was not described until 1950, by which time its distribution had been dramatically reduced (Miller, 1950).

As of August 2019, there were 17 populations of Gila trout (*Oncorhynchus gilae*) inhabiting approximately 137.5 kilometers (km) (85.2 miles (mi)) of stream habitat. All known, remnant genetic lineages (Main Diamond Creek, South Diamond Creek, Whiskey Creek, Iron Creek and Spruce Creek) were represented by at least two wild populations. The five remnant lineages encompass the existing genetic diversity of the species, and each contributes significantly to it. Heterozygosity of all of the remnant lineages of Gila trout, with the exception of Iron Creek, has declined from 2002 to 2013. Loss of genetic diversity has been particularly acute in the Spruce Creek lineage. The Main Diamond and South Diamond lineages were relatively secure, with hatchery broodstock and production having been successfully developed and populations present in 9 of the 17 occupied streams. The current situation of the other three lineages, however, is less secure, and only one mixed-lineage populations existed by August of 2019. The remnant-lineage populations in Whiskey Creek and Spruce Creek were extirpated following large-scale, high-severity wildfire. At the beginning of 2019, populations of these lineages were present in only three other streams, and these streams supported only small populations. The Iron Creek lineage occurred in only two streams at the beginning of 2019, and those populations contain unique genetic variation.

Resiliency of Gila trout is constrained by the patchy distribution and geographic isolation of cold-water streams, many of which are single-stream systems that are relatively small, throughout its historical range. Few, if any, extant populations of Gila trout are large enough to survive extremes in environmental conditions without experiencing a severe population bottleneck (drastic reduction in population size). Currently only the Mogollon and Willow creek

drainages (where the South Diamond lineage has been established) have a dendritic (i.e., branching stream network) population structure, and even the largest single-stream systems where Gila trout have been repatriated (e.g., Black Canyon) have been subject to extirpations associated with environmental stochasticity. Recovery actions implemented to date have greatly improved redundancy by increasing the number of populations of Gila trout. However, spatial distribution of populations is constrained by the geographical distribution of currently suitable habitat for the species.

Spikedace

Historically, this species was common throughout much of the Verde, Agua Fria, Salt, San Pedro, San Francisco, and Gila (upstream from Phoenix) river systems. Their range and abundance are now much reduced. Spikedace are now restricted to portions of the upper Gila River (Grant, Catron, and Hidalgo counties, New Mexico); Aravaipa Creek (Graham and Pinal counties, Arizona); Eagle Creek (Graham and Greenlee counties, Arizona); and the Verde River (Yavapai County, Arizona). The species is now common only in Aravaipa Creek in Arizona and one section of the Gila River south of Cliff, New Mexico. The Verde River is presumed occupied; however, the last captured fish from this river was from a 1999 survey. Spikedace from the Eagle Creek population have not been seen for over a decade, although they are still thought to exist in numbers too low for the sampling efforts to detect. The Middle Fork Gila River population is thought to be very small and has not been seen since 1991, but sampling is localized and inadequate to detect a sparse population.

During the last century, habitat destruction, and competition and predation by nonnative aquatic species have reduced the historical range of the spikedace (Miller 1961; Hendrickson and Minckley 1984; Williams *et al.* 1985; Marsh *et al.* 1989; USFWS 1994). Both historical and present landscapes surrounding spikedace habitats have been impacted to varying degrees by domestic livestock grazing, mining, agriculture, timber harvest, wildfire, recreation, development, or impoundments (Hendrickson and Minckley 1984; Belsky *et al.* 1999). Detrimental land and water use practices have impaired perennial flows and natural hydrographs (Minckley and Meffe 1987). These activities degrade spikedace habitats by altering flow regimes, increasing watershed and channel erosion, contributing to increased sedimentation, and adding contaminants to streams and rivers (Belsky *et al.* 1999; Donahue 2000).

III. Effects of the Action on Species and Cumulative Effects

Northern Mexican gartersnake

Proposed actions are within habitat for the species and the potential exists for this species to be incidentally captured in the minnow traps used to catch narrow-headed gartersnakes. Although mortality is possible, based off past surveying events it is extremely rare and unlikely to occur. Therefore, the expected effect to the species from the proposed action is stress while handling the species. Only federally-permitted personnel will handle any snakes that are caught following current protocols found in Nowak (2013). All snakes will be immediately released near the point of the capture site. Additionally, all proposed survey sites are north of the records for this species within New Mexico, so the likelihood that this species will be captured is considered low.

Narrow-headed gartersnake

The species will be captured using the techniques mentioned in “Description of Proposed Action” above. Adverse impacts to narrow-headed gartersnakes from traps, VES, and direct handling are likely small in magnitude, temporary or short-term, and geographically local with respect to each local population. Although mortality is possible, based off past surveying events it is extremely rare and unlikely to occur. Therefore, the expected effect to the species from the proposed action is stress while handling the species. Only federally-permitted personnel will handle any snakes that are caught following current protocols in Nowak (2013). All Diamond Creek snakes will be translocated to Black Creek Canyon following protocol in Nowak (2013). Snakes captured at all other locations will be released near the capture site.

Chiricahua leopard frog

Proposed actions are within habitat for the species and the potential exists for this species to be incidentally captured in the minnow traps used to catch the narrow-headed gartersnakes. Although mortality is possible, based off past surveying events it is extremely rare and unlikely to occur. Therefore, the expected effect to the species from the proposed action is stress while handling the species. Only federally-permitted personnel will handle any frogs that are caught, and all frogs and tadpoles caught in minnow traps will be promptly released. All protocols in the federal recovery plan for the species shall be adhered to.

New Mexico meadow jumping mouse

While the proposed work does not take place where the jumping mouse is known from within the Gila and the preferred habitat of the gartersnake often lacks the riparian habitat the jumping mouse requires, additional steps will be taken on the off-chance minnow trapping takes place where an undescribed population exists for the mouse. Contractors will be trained on properly identifying jumping mouse habitat and will notify both the mouse and gartersnake lead biologists at the New Mexico Ecological Services Field Office if mouse habitat is identified at a survey site. If a jumping mouse is observed or caught, both the mouse and gartersnake lead biologists will be immediately contacted, and all minnow traps will be pulled each night for the duration of the survey session. Although mortality is possible, based off past surveying events it is extremely rare and unlikely to occur.

Loach minnow

Although loach minnow will not be the targeted species, there is the potential for the species to be captured during survey activities. The species would be briefly handled before being released back into the waterway. Although mortalities are possible, it is extremely rare and unlikely to occur. Therefore, the expected effect to the species from the proposed action is stress while handling the species. Individuals are expected to fully recover once being released.

Gila Trout

Although Gila trout will not be the targeted species, there is the potential for the species to be captured during survey activities. The species would be briefly handled before being released back into the waterway. Although mortalities are possible, it is extremely rare and unlikely to

occur. Therefore, the expected effect to the species from the proposed action is stress while handling the species. Individuals are expected to fully recover once being released.

Spikedace

Although spikedace will not be the targeted species, there is the potential for the species to be captured during survey activities. The species would be briefly handled before being released back into the waterway. Although mortalities are possible, it is extremely rare and unlikely to occur. Therefore, the expected effect to the species from the proposed action is stress while handling the species. Individuals are expected to fully recover once being released.

Cumulative Effects

Past, present, and reasonably foreseeable actions in the action area include, but are not limited to, livestock grazing, mining, water management, residential development on private lands, various vegetation treatments, and fire management. Some actions (e.g., vegetation treatments) would result in improved ecologic function, whereas others (e.g., development) may cause surface disturbance, fragment habitat, and reduce habitat quality for aquatic wildlife. The effects of climate change are anticipated to increase the scale and intensity of effects on aquatic habitats, especially in high-value riparian and aquatic habitats in the arid landscape, in combination with habitat-altering activities.

IV. Conclusion

After reviewing the current status of the species, the environmental baseline for the action area, the effects of the proposed action and cumulative effects, it is the Service's biological opinion that the action, as proposed, is not likely to jeopardize the continued existence of the New Mexico meadow jumping mouse, Chiricahua leopard frog, narrow-headed gartersnake, Northern Mexican gartersnake, Gila trout, loach minnow, and spikedace.

The Service reached these conclusions because:

- A. The primary purpose of the proposed action is to conserve listed species;
- B. The proposed action was developed in coordination with the Service for that purpose;
- C. The proposed action gives full consideration to, and is consistent with, the survival and recovery needs of the listed species and the role of the action area in providing for those needs;
- D. There is either a proven track record for successful implementation of the proposed action, or there is a high level of certainty that the proposed action is likely to produce a beneficial impact for the listed species;
- E. Adverse impacts (including those that conform to incidental take) are likely to be small in magnitude, temporary (meaning not continuous, recurring, or chronic), short-term and geographically local with respect to each local population being addressed;
- F. The amount or extent of incidental take of listed species is likely to be low, and is not likely to have adverse population-level impacts to the affected listed species; and,

- G. The project is not likely to cause a permanent net loss of habitat or net loss of habitat function.

V. Incidental Take Statement

For proposed actions that are in accordance with an active cooperative agreement and are in furtherance with the Endangered Species Act (ESA), threatened species take covered under that cooperative agreement is authorized under 50 CFR 17.31(b). Although take for the proposed action is authorized under 50 CFR 17.31(b), WSFR is still required to complete formal consultation to ensure their proposed action will not jeopardize the threatened species' continued existence. We have determined that the level of anticipated take is not likely to result in jeopardy to the New Mexico meadow jumping mouse, Chiricahua leopard frog, narrow-headed gartersnake, Northern Mexican gartersnake, Gila trout, loach minnow, or spokedace. Although we anticipate some incidental take to occur, the proposed action is in furtherance of the ESA and should ultimately result in a benefit for the species.

Although possible, the New Mexico Ecological Services Field Office (NMESFO) does not expect direct mortality as a result of the surveys. However, all captured species are anticipated to be harassed as a result of this proposed action. Harassment is expected to occur due to surveying and direct handling. If a listed species dies from the proposed action, then take will be considered exceeded and coordination with the NMESFO will be required once phone service is available and before subsequent surveys at new locations take place.

Reasonable and Prudent Measures and Terms and Conditions

In order to be exempt from the prohibitions of section 9 of the ESA, WSFR must comply with the following nondiscretionary reasonable and prudent measure, which outlines reporting/monitoring requirements, to minimize impacts of incidental take of New Mexico meadow jumping mouse, Chiricahua leopard frog, narrow-headed gartersnake, Northern Mexican gartersnake, Gila trout, loach minnow, and spokedace.

1. WSFR and the Department must report any mortalities of listed species to the NMESFO within 48 hours of access to communication.
2. WSFR and the Department shall submit a monitoring report to the New Mexico Ecological Services Field Office at the end of each calendar year to nmesfo@fws.gov. This report shall briefly document the annual projects conducted, the survey results, the number of individuals translocated, and, if any are found dead, the suspected cause of mortality.

No additional terms and conditions are considered necessary to carry out the reasonable and prudent measure.

VI. Reinitiation Notice

This concludes formal consultation on the proposed Section 6 funding for Survey and Radio-tracking of Narrow-headed Gartersnakes. As provided in 50 CFR §402.16, reinitiation of formal consultation is required where discretionary Federal agency involvement or control over the action has been retained (or is authorized by law) and if: (1) the amount or extent of incidental

take is exceeded; (2) new information reveals effects of the agency action that may affect listed species or critical habitat in a manner or to an extent not considered in this opinion; (3) the agency action is subsequently modified in a manner that causes an effect to the listed species or critical habitat not considered in this opinion; or (4) a new species is listed or critical habitat designated that may be affected by the action. In instances where the amount or extent of incidental take is exceeded, any operations causing such take must cease pending reinitiation.

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